

# NASA TECH BRIEF



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## Silazane Elastomer Remains Resilient at 400°C

In recent studies it has been found that a smooth, unfoamed elastomer in thicknesses of up to 1 millimeter can be obtained by heating mixtures of approximately 90 parts by weight of "methylphenyl silazane" with only 10 parts by weight of ethylenediamine silazane at 190°C for 18 hours in air. The elastomer is unaffected by common acids, alkalies, and organic solvents. Its thermal stability, chemical resistance, and physical properties should make it of interest for various applications. The methods of preparing the reactants and the elastomer product are described below.

### *Preparation of "methylphenyl silazane".*

In a 2-liter, 3-neck flask fitted with a stirrer, reflux condenser, thermometer, and gas inlet tube, were placed 1600 ml of dry benzene and 191.1 g (1.0 mole) of methylphenyldichlorosilane. Ammonia, previously dried over sodium, was passed over the liquid, with constant stirring for 3 hours; and the resulting mixture was refluxed for 3 hours. The clear supernatant liquid was negative to the Beilstein test for halogens. The residue was filtered off and extracted with benzene; and the product was isolated by distilling off the benzene, finally at reduced pressure. The pot temperature did not exceed 80°C. The product, called "methylphenyl silazane," was a cloudy, viscous liquid weighing 129.2 g.

On heating the product, the results were similar to those obtained with a variety of silazanes in that fibers could be pulled from the melt, but which were not tough polymers with high softening points. Continued heating produced foamed solids with high chemical and thermal stability.

### *Preparation of an elastomer from the "methylphenyl silazane" and ethylenediamine silazane.*

The "methylphenyl silazane" was partially polymerized by boiling it in a test tube for 3 minutes. When cool, it was mixed with 10 percent by weight of ethylenediamine silazane (prepared by the method described in Tech Brief 66-10194), and the mixture was heated in an oven at 190°C for 18 hours. A non-foamed elastomer was produced in a maximum thickness of 1 mm.

The elastomer was unaffected by acetone, tetrahydrofuran, acids, and alkalies, and was unchanged after being heated at 190°C for 8 days. The sample retained most of its original resilience after being heated at 400°C for 2 hours. No simple formula can now be proposed for the elastomer.

A sample of glass cloth coated with the elastomer formed a flexible, impervious sheet. This composite should be useful as a gasketing material for application at higher temperatures (up to 400°C).

### **Note:**

Inquiries concerning this invention may be directed to:  
Technology Utilization Officer  
Marshall Space Flight Center  
Huntsville, Alabama 35812  
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### **Patent status:**

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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